What is claimed is:

1. An isolated mammalian nucleic acid molecule encoding a PAK4 serine/threonine kinase.

2. The isolated nucleic acid molecule of claim 1, wherein the nucleic acid molecule is a DNA molecule.

3. The isolated DNA molecule of claim 2, wherein the DNA molecule is a cDNA molecule.

4. The isolated DNA molecule of claim 2, wherein the DNA molecule is a genomic DNA molecule.

5. The isolated nucleic acid of claim 1, wherein the nucleic acid molecule is an RNA molecule.

6. The isolated nucleic acid molecule of claim 1, wherein the nucleic acid molecule encodes a mammalian PAK4 serine/threonine kinase.

7. The isolated nucleic acid molecule of claim 1, wherein the mammalian PAK4 serine/threonine kinase is a human, mouse or rat PAK4 serine/threonine kinase.

8. The isolated nucleic acid molecule of claim 6, wherein the nucleic acid molecule encodes a PAK4 serine/threonine kinase comprising an amino acid sequence as set forth in Figure 1A (SEQ ID NO: 2).

9. The isolated nucleic acid molecule of claim 8, wherein the amino acid sequence comprises a GTPase binding domain (GBD).

10. The isolated nucleic acid molecule of claim 6, wherein the nucleic acid molecule encodes a PAK4 serine/threonine kinase, wherein the PAK4

serine/threonine kinase has substantially the same amino acid sequence as set forth in Figure 1A (SEQ ID NO: 2).

11. The isolated nucleic acid molecule of claim 6, wherein the nucleic acid molecule encodes a PAK4 serine/threonine kinase, wherein the PAK4 serine/threonine kinase has the amino acid sequence as set forth in Figure 1A (SEQ ID NO: 2).

12. An isolated nucleic acid molecule encoding a mutant homolog of the mammalian PAK4 serine/threonine kinase whose amino acid sequence is set forth in Figure 1A (SEQ ID NO: 2).

13. The isolated nucleic acid molecule of claim 12, which is a deletion mutant.

14. The deletion mutant of claim 13, wherein the encoded mutant homolog comprises a GTPase binding domain.

15. The deletion mutant of claim 13, wherein the encoded mutant homolog does not comprise a GTPase binding domain.

16. The isolated nucleic acid molecule of claim 6, wherein the mammalian PAK4 serine/threonine kinase comprises the nucleic acid sequence set forth in Figure 1A (SEQ ID NO:1).

17. A fusion protein comprising a PAK4 serine/threonine kinase or a fragment thereof and a second peptide.

18. A vector comprising the nucleic acid molecule of claim 1.

19. The vector of claim 18 adapted for expression in a

host cell which comprises the regulatory elements necessary for expression of the nucleic acid molecule in the host cell operatively linked to the nucleic acid molecule encoding the PAK4 serine/threonine kinase as to permit expression of the PAK4 serine/threonine kinase.

20. The vector of claim 19, wherein the host cell is a eukaryotic, bacterial, insect or yeast cell.

21. The vector of claim 20, wherein the eukaryotic host cell is a mammalian cell.

22. The vector of claim 21, wherein the vector is a plasmid.

23. A vector comprising the nucleic acid molecule of claim 3.

24. The vector of claim 23 adapted for expression in a host cell which comprises the regulatory elements necessary for expression of the nucleic acid molecule in the host cell operatively linked to the nucleic acid molecule encoding the PAK4 serine/threonine kinase as to permit expression of the PAK4 serine/threonine kinase.

25. The vector of claim 24, wherein the host cell is a eukaryotic, bacterial, insect or yeast cell.

26. The vector of claim 25, wherein the eukaryotic host cell is a mammalian cell.

27. The vector of claim 26, wherein the vector is a plasmid.

28. The plasmid of claim 27 designated SrαHAPAK4 (ATCC Accession No. 209888.

29. A method of producing a PAK4 serine/threonine kinase, which comprises growing a host cell comprising the vector of claim 24 under suitable conditions permitting production of the PAK4 serine/threonine kinase and recovering the PAK4 serine/threonine kinase so produced.

30. The method of claim 29, further comprising purifying the recovered PAK4 serine/threonine kinase.

31. A method of producing a polypeptide having the biological activity of a protein encoded by the nucleic acid molecule encoding a PAK4 serine/threonine kinase which comprises growing the host cells of claim 24 under suitable conditions permitting production of the polypeptide and recovering the polypeptide so produced.

32. The method of claim 31, further comprising purifying the recovered polypeptide.

33. A purified mammalian PAK4 serine/threonine kinase.

34. The purified mammalian PAK4 serine/threonine kinase of claim 33 which is a human PAK4 serine/threonine kinase.

35. A protein comprising substantially the amino acid sequence set forth in Figure 1A.

36. An oligonucleotide comprising a nucleic acid molecule of at least 15 nucleotides capable of specifically hybridizing with a unique sequence included within the sequence of the isolated nucleic acid molecule encoding a PAK4 serine/threonine kinase of claim 1.

37. The oligonucleotide of claim 36, wherein the nucleic

acid is DNA.

38. The oligonucleotide of claim 36, wherein the nucleic acid is RNA.

39. An antisense oligonucleotide comprising a sequence capable of specifically hybridizing with a unique sequence included within the mRNA molecule of claim 5.

40. An antisense oligonucleotide comprising a sequence capable of specifically hybridizing with a unique sequence included within the genomic DNA molecule of claim 4.

41. An antibody capable of binding to the PAK4 serine/threonine kinase of claim 33 or 34.

42. The antibody of claim 41, wherein the antibody is a monoclonal antibody.

43. The antibody of claim 41, wherein the antibody is a polyclonal antibody.

44. A monoclonal antibody directed to an epitope of a PAK4 serine/threonine kinase.

45. A method of inhibiting PAK4 function comprising administering a ligand comprising an amino acid domain which binds to a GTP binding protein so as to inhibit binding of the GTP binding protein to PAK4.

46. A method of inhibiting PAK4 function comprising administering a ligand which binds to the GTP binding domain of PAK4 so as to inhibit PAK4 binding to a GTP binding protein.

47. A method of inhibiting PAK4 serine/threonine kinase

function comprising administering a ligand which blocks an ATP binding domain so as to inhibit PAK4 serine/threonine kinase function.

48. The method of any one of claims 45, 46, or 47, wherein inhibiting PAK4 function thereby inhibits polymerization of actin cytoskeleton.

49. The method of either of claims 45 or 46, wherein the GTP binding protein is Cdc42Hs or Rac.

50. The method of either of claims 45 or 46, further comprising inhibition induction of filopodia.

51. The method of either of claims 46 or 47, wherein the ligand is an antibody capable of binding to the PAK4 serine/threonine kinase.

52. The method of claim 51, wherein the antibody is a monoclonal or a polyclonal antibody.

53. A method of inhibiting growth of a tumor cell comprising blocking Cdc42Hs by administering a ligand capable of binding to a Cdc42Hs binding site of a PAK4 serine/threonine kinase.

54. The method of claim 53, wherein the tumor cell growth is inhibited <u>in vivo</u> or <u>in vitro</u>.

55. The method of claim 53, wherein the ligand is an antibody capable of binding to the PAK4 serine/threonine kinase.

56. The method of claim 55, wherein the antibody is a monoclonal or a polyclonal antibody.

57. A pharmaceutical composition comprising an amount of the oligonucleotide of any one of claims 36, 37, 38,

39, or 40 effective to prevent overexpression of a PAK4 serine/threonine kinase and a pharmaceutically acceptable carrier capable of passing through a cell membrane.

58. A pharmaceutical composition comprising an amount of the antibody of any one of claims 41, 42, 43 or 44 effective to block binding of a PAK4 serine/threonine kinase to a GTP binding protein and a pharmaceutically acceptable carrier capable of passing through a cell membrane.

59. A method of treating an abnormality in a subject, wherein the abnormality is alleviated by the inhibition of binding of a PAK4 serine/threonine kinase and a GTP binding protein which comprises administering to the subject an effective amount of the pharmaceutical composition of claim 57 effective to block binding of the PAK4 serine/threonine kinase and the GTP binding protein in the subject, thereby treating the abnormality in the subject.

60. The method of claim 59, wherein the GTP binding protein is Cdc42Hs or Rac.

61. The method of claim 59, wherein the abnormality is cancer or arthritis.

62. A method of treating an abnormality in a subject, wherein the abnormality is alleviated by the inhibition of binding of a PAK4 serine/threonine kinase and a GTP binding protein which comprises administering to the subject an effective amount of the pharmaceutical composition of claim 58 effective to block binding of the PAK4 serine/threonine kinase and the GTP binding protein in the subject, thereby treating the abnormality in the subject.

63. The method of claim 62, wherein the GTP binding protein is Cdc42Hs or Rac.

64. The method of claim 62, wherein the abnormality is cancer or arthritis.